

way to proper lengths, stripping them to the rubber covering for the end that is to be connected to terminal or lightning arresters, and connecting the other end to the bootleg connection or pothead. We complete this connection, including the placing of the stranded cable, filling the bootleg with victrolac or compound. On our 1935 work the men took measurements for length of cable for the

track leads but soon found this was not necessary as in locating our foundations we place them in the center between the insulated joints so that we are able to make up our connections without the necessity of making a trip over the road to secure measurements. The procedure explained above has reduced the labor cost of installation of parkway approximately 40 per cent.

Repairing Line Breaks

"What is the best method to be used by one man alone when making temporary repairs of line wire breaks?"

Describes Procedure

MAURICE PEACOCK, JR.
Mt. Airy, Pa.

First of all, the necessary tools that a man should have to do such a job include: A pair of pole climbers, safety belt and strap, gloves, splicing tubes, tar tape and scraping knife if working on insulated wires, two pair of linemen's pliers, at least a pole length of the proper kind of wire, and a wire puller.

If a line break has occurred between two poles and at least one end is on the ground in reach, I climb the pole from which the end of the broken wire is dangling out of reach. I cut this wire at about 1½ ft. from the cross arm on the "break" side of the pole for splicing purposes later on. When I have cut the wire, I return to the ground and splice a piece of new wire to the piece of wire hanging from the opposite pole. Remounting the first pole with the new wire in my hand, which is joined to the other broken part of the line, I place the wire puller between the new wire and the 1½ ft. section and splice the two together.

Permanent Repairs Preferred

J. L. ORCHARD

Assistant Signalman, St. Louis-San Francisco, Old Orchard, Mo.

I am assuming that this question was submitted by someone working for a road which does not require the maintainer to do line work among his other duties. I am of the understanding that some roads have line gangs to do the general line maintenance and hence the maintainer does not have to have had line experience. The Frisco requires the maintainer to not only shoot trouble on line cases,

but to maintain the line in good condition at all times.

In order that the signalman on the Frisco may be a capable lineman, he is given line training at some time or other during his apprenticeship in order that he will be able to handle all cases of line trouble that may occur without having to call upon experienced linemen, which would be both expensive as well as cause unnecessary delay in getting the line trouble eliminated. His training is given him while working in construction gangs, and he is taught line work without the benefit of "grunts," or groundmen, who, in most phases of line work, assist the lineman by pulling up crossarms by means of hand-lines, and make themselves practically indispensable to linemen who generally work with them. However, Frisco maintainers work by themselves as a

rule, and it was considered more practical to teach the apprentice to carry the crossarms up the pole by himself and do all work on the pole independent of outside assistance.

When working by oneself on a case of a broken line wire, it is generally as easy to make permanent repairs on a line wire as to make a temporary repair and by making permanent repairs, one saves the time and expense of having to come back to the scene of the trouble. Also, as a safety feature, permanent repairs are much safer than any temporary repair. As the break would in all probability be in the middle of the span and too far away from the pole to make permanent repairs, it is considered the best practice to string new wire from the break to the nearest pole and cut out the wire that was formerly in its place. When making up the sleeve at the break, it is a good policy to cut off about a foot of the old wire and put the sleeve that distance from the break as the wire is probably weak in that particular spot. After the sleeve has been made up, on the ground, the maintainer can climb the pole and cut out the slack and make up the joint on the pole, which joint should be made at least two feet away from the arm. This procedure will require only two copper sleeves, tape, not over a half span of line wire, connectors, pliers, climbers, safety belt, slack blocks, and not over 10 or 15 min. time. The technical details of scraping the wire, exact amount of turns to make in the sleeve, taping, etc., I am omitting as they depend largely upon the particular road's standards.

Approach Indications to Train-Order Signals

"Where train-order signals are in service at stations in automatic block signal territory, do you arrange the control of the automatic signals in approach to the stations so that such an automatic signal will indicate caution when the train-order board indicates that orders are to be picked up?"

Discusses Advantages and Disadvantages

I. A. UHR

Signal Engineer, St. Louis-San Francisco Springfield, Mo.

It is our practice to arrange for an automatic block signal to indicate caution when a train-order signal is displayed for orders. The majority of train and enginemen favor this arrangement. However, I have heard some comment that an engineman

does not know whether this caution signal indicates that the train-order signal is displayed for orders, the next automatic block signal at stop, or a combination of both. Therefore, if only the train-order signal is displayed, some time is lost observing a caution signal restriction throughout the entire block.

When a train is given a caution indication when a train-order signal is displayed, the speed can be reduced in ample time so that the train orders can

(Continued on page 478)

(Continued from page 474)

be safely picked up, especially where view of the train-order signal is short. I feel that it is safer operation and desirable to provide the caution signal, especially since the speed of trains has been increased. On the whole there is more delay to trains slowing up when approaching a train-order signal so that they can observe its indication than when trains run through a caution block on account of a train-order indication being displayed and the next automatic block signal in the clear position.

A sufficient number of efficiency tests are made on this railroad, with signals at caution position, to insure that, under such circumstances, the train will run the entire block observing the indication and not accelerate speed after the train-order signal is seen to be displayed, assuming that the next automatic block signal is in the clear position.

Considered Necessary

G. H. DRYDEN

Signal Engineer, Baltimore & Ohio
Baltimore, Md.

Where automatic signals are located near the telegraph office, they are wired to serve both as automatic and train-order signals, the arrangement being the same as at interlockings. When orders are received, the operator opens a hand switch, which causes the signal to indicate "stop" and the next signal in the rear to indicate "approach." Where automatic signals are not conveniently located to serve as combined block and train-order signals, a separate train-order signal is erected at the telegraph office, which, when set to "stop," causes the next automatic signal in the rear to indicate "approach."

Train-Order Signals Operated Independently

W. H. STILWELL

Signal Engineer, Louisville & Nashville
Louisville, Ky.

Where train-order signals are in service at stations in automatic block signal territory, those signals are operated wholly independent from the automatic signals.

Operating rules on the Louisville & Nashville require that train-order signals must indicate "stop" except when changed to indicate "19" order for delivery or "proceed" to allow a train, for which there are no orders, to pass. These rules further require that, when

a train approaching a train-order office has reached a point where the train-order signal is visible, the engineman will give four short sounds of the whistle. If there are no orders for the train, the signal must be changed to "proceed." If the signal is not changed, the train must be brought to a stop.

It will be noted that, with this system of operation of train-order signals, any inter-connection with the automatic signal system would be impractical.

On the Pennsylvania

By W. M. POST

Signal Engineer, Pennsylvania, Philadelphia, Pa.

The question, as worded, does not apply exactly to the practice on the Pennsylvania. When train orders are to be delivered to a train, the towerman or operator must display the stop indication on the home interlocking signal or other block signal as the case may be, and then display, on a bracket below the tower window, a banner and at night also a lamp. This combination forms a train-order signal. However, in automatic block signal territory, all the home interlocking signals in the normal direction of traffic have operative distant signals. Therefore, the answer to the question, insofar as the Pennsylvania practice is concerned, is yes, we do, in automatic block signal territory, have a distant signal in approach to the home signal, which, in combination with the use of a banner, forms an aspect indicating to an engineman that train orders are to be picked up.

In order to explain the practice on our road, the following rules and explanations are given: On the Pennsylvania our Rule No. 221, in the Book of Rules, states:

"A fixed signal must be used at each train-order office, which will indicate stop when there is an operator on duty, except when changed to proceed to allow a train to pass after getting orders, or for which there are no orders. A train must not pass the signal while stop is indicated. The signal must be returned to stop as soon as a train has passed."

Our train-order signal is a red banner, with provision for attaching a red light, for "31" orders, or "19" orders restricting superiority of train at that point, and a yellow banner with provision for attaching a yellow light for other "19" orders. These banners are displayed in a place provided on the tower, only when the operator has train orders to deliver,

and are used in conjunction with fixed signals at interlockings and block stations. Our Rule 221a governs the procedure when train orders are to be delivered and reads as follows:

"When a train order is to be delivered to a train, the fixed signal must be displayed at stop for the track and in the direction of the approaching train, and a train-order signal must be displayed in the place provided for the purpose, a red train-order signal indicating '31' orders, or '19' orders that restrict the superiority of the train at that point, a yellow train-order signal indicating other '19' orders.

"Operators must not clear these signals for an approaching train unless they know that the train is not the one to which orders are addressed.

"This combination of signals must be acknowledged by the engineman by two short sounds of the engine whistle.

"In delivering '19' orders, that restrict the superiority of train addressed at that point, the fixed signal must remain at stop until such orders have been delivered, and in delivering '31' orders, the fixed signal must remain at stop until the engineman and conductor have signed the orders.

"In delivering '19' orders, without stopping a train, the operator must, after the signal has been acknowledged, leave the yellow train-order signal displayed until the orders have been delivered, place the fixed signal at its proper position, go on the ground and hand the orders to the engineman and conductor. For freight trains, the conductor's copy must be handed on the cabin car. When the yellow train-order signal is displayed, the speed of the train must be reduced sufficiently to enable the operator to deliver the order. If the engineman fails to catch the order, the train must be stopped, and not proceed without a proper train order."

While a train-order signal is displayed in the direction of an approaching train or trains, it must not be passed by any such train on any track, except as provided in last paragraph of Rule 221a (221a. amplified).

At a few locations where the train-order banner cannot be seen from the fixed signal location, provision is made for displaying a flashing yellow light located below the fixed signal, and the procedure for delivering train orders is outlined in Time Table Special Instructions. We have such a signal at Odenton, Md., on our Baltimore division, and Time Table Instruction No. D1705 is as follows:

"At Odenton, when a train order
(Continued on page 480)

(Continued from page 478)

is to be delivered to a train, the signalman will display yellow flashing-light signal with stop indication on the home signal governing movements of the train involved. Proceed signal will not be displayed until after this combination of signals is acknowledged by the engineer by two short sounds of the engine whistle.

"If yellow flashing-light signal is displayed with proceed signal before proper acknowledgment by engineer of train governed by such signal, train must be stopped and report promptly made to superintendent.

"The signalman will also comply with Rule 221a by displaying train-order signal at the tower in addition to the above."

Yes, in All Cases

M. A. BAIRD

Supt. Tel. & Sig., Erie
Cleveland, Ohio

The answer is "Yes, in all cases." It is my opinion that an approach indication is practically as essential for a train-order signal as it is for any other signal in stop position.

Few Train Orders Used

J. P. MULLER

Engineer of Signals & Telegraph, Boston
& Maine, Boston, Mass.

We do not give an approach indication on our automatic block signals to indicate the position of train-order signals. On considerable of our heaviest traffic territory we have C.T.C. signaling in service, and train orders are used only on rare occasions under abnormal conditions. On practically all of the remainder of our double-track territory, we use a 45 deg. position of the train-order signal, under direction of the dispatcher, to permit inferior trains to proceed in the same direction on the time of superior trains. This, of course, eliminates many orders in this territory. On single track, our rules specify that orders should not be sent to a superior train at the meeting or waiting point if it can be avoided. If it is necessary to so place such an order, special precautions must be taken to insure safety.

From a technical signal standpoint, and, to a certain extent, from an operating viewpoint, it would undoubtedly be desirable to give an approach aspect for a train-order signal. Such a signal should be located at least full braking distance from the train-order signal, which, in many instances, would mean

locating it on the second or third automatic signal from the train-order signal, unless existing automatic signals were relocated or an entirely separate signal erected for this purpose. For this reason, an entirely distinctive indication should be provided, as otherwise the engineer receiving a standard automatic approach signal, followed

by the next automatic signal being in either clear or approach position, might think he was following a preceding train and overlook the fact that he was receiving an approach to a train-order signal indication. To provide such a system would involve considerable installation and maintenance expense.

Location of Signals at Spring Switches

"When installing a signal for the protection of a spring switch in the facing point direction, how far from the switch should the signal be located?"

Practice on the Seaboard

F. H. BAGLEY

Supt. Telegraph & Signals, Seaboard Air
Line, Norfolk, Va.

On a single track railroad, the spring switch is usually installed on one of the passing track switches. If this is done in automatic signal territory, we make use of one of the entering signals at the head block for checking the spring switch. These signals are usually located about 15 or 20 ft. from the switch point. If this happens to be in non-automatic signal territory, the signal would be located about the same distance from the switch points, and, if the visibility of this signal does not equal braking distance, we install a distant signal. Of course, in automatic signal territory, the intermediate automatic signal would become the distant signal.

point to have it located on good solid ground.

There may also be conditions where there is a sharp curve approaching the switch, and if the signal were located within a few feet of the switch point the view of approaching trains might be materially restricted. If the view of the signal, under such conditions, could be greatly improved by locating it 200 to 300 ft. in approach of the switch point, I would see no objection to such a practice.

Where the curvature of the track is such that only a very short view could be had of the signal, unless located from 1,000 to 2,000 ft. in approach of the switch, I think in such a case the facing point signal should be placed near the switch and a distant signal provided.

Definite Distance Impracticable

C. A. TAYLOR

Supt. Telegraph & Signals, C. & O.
Richmond, Va.

I do not think that it is practicable to set up a definite distance at which a signal protecting facing point movements over a spring switch should be placed from the switch as I feel that the location of the signal would be governed to a great extent by local conditions. If the track is tangent for some distance in approach of the switch point, I see no reason why the signal should not be placed within 40 or 50 ft. of the switch, provided such a location is not undesirable due to a high fill or deep cut. If such conditions are encountered within a few feet of the switch, I see no reason why the signal should not be placed far enough back from the switch

Unusual Signal Trouble

A. C. JOHNSON

Signalman, Union Pacific,
Grand Island, Neb.

One night I was called out for a signal at stop in the Columbus yards and to my relief it was at stop when I arrived.

About four blocks west of the signal are the coal chutes and a cross-over from the main line passing track. At the insulated joint on the lead rail, between the switch point and frog, I found a piece of brake shoe had fallen down and been run over by the wheels, pulverizing the shoe and wedging a piece of the brake shoe between the rail ends of the insulated joint, causing a perfect short.

At another time this same joint, believe it or not, was shorted out by an engine slipping the drivers directly on the joint which caused a perfect weld across the end post.